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A Deep Learning Approach for Retinal Image Feature Extraction

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ABSTRACT

Retinal image analysis is crucially important to detect the different kinds of life-threatening cardiovascular and ophthalmic diseases as human retinal microvasculature exhibits remarkable abnormalities responding to these disorders. The high dimensionality and random accumulation of retinal images enlarge the data size, that creating complexity in managing and understating the retinal image data. Deep Learning (DL) has been introduced to deal with this big data challenge by developing intelligent tools. Convolutional Neural Network (CNN), a DL approach, has been designed to extract hierarchical image features with more abstraction. To assist the ophthalmologist in eye screening and ophthalmic disease diagnosis, CNN is being explored to create automatic systems for microvascular pattern analysis, feature extraction, and quantification of retinal images. Extraction of the true vessel of retinal microvasculature is significant for further analysis, such as vessel diameter and bifurcation angle quantification. This study proposes a retinal image feature, true vessel segments extraction approach exploiting the Faster RCNN. The fundamental Image Processing principles have been employed for pre-processing the retinal image data. A combined database assembling image data from different publicly available databases have been used to train, test, and evaluate this proposed method. This proposed method has obtained 92.81% sensitivity and 63.34 positive predictive value in extracting true vessel segments from the top first tier of colour retinal images. It is expected to

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